

REMARKS

At the outset, applicants would like to thank the Examiner for his courtesy in conducting a telephone interview on October 5, 2005. The arguments and proposed amendments presented herein correspond to those advanced during the October 5, 2005 interview. Claims 1-10 are pending in this application, of which claims 1 and 6 are independent.

Applicants have amended claims 1 and 6, cancelled claims 3 and 8, and added new claims 72-74, which depend from claim 1 to recite additional features of the laser surgery apparatus. The "controller" language added to claim 1 is supported by at least page 7, lines 26-28, page 12, lines 23-25; and Figure 19. The language regarding operating the laser to provide "pulses of adjustable length shorter than 100 ms" now added to claim 1 was originally recited in cancelled claim 3. The language relating to delivering laser pulses "of adjustable length shorter than 100 ms at energy levels between 8 and 80 Joules per pulse" now added to claim 6 was originally recited in cancelled claim 8.

Support for new claim 72 can be found at page 7, lines 28-30; page 11, line 31 to page 12, line 8; page 12, lines 7-10; page 13, lines 9-12; and in Figures 1 and 20. Support for claims 73 and 74 can be found at page 9, lines 10-25; page 9, line 30 to page 10, line 4; page 10, lines 21-28; and in Figures 4 and 6. Accordingly, no new matter is added.

35 U.S.C. § 103(a)

Claims 1-10 have been rejected under 35 U.S.C. § 103(a) over Brauer U.S. Patent No. 5,951,543 in view Eisel U.S. Patent No. 5,412,681. Applicants respectfully traverse this rejection for the following reasons.

According to the Office Action, Brauer discloses "a cardiac laser surgery apparatus and method comprising: a sealed CO₂ laser ... and a laser delivery system ... wherein the laser providing pulses of adjustable length in time so as provide energy of between 8 and 10 Jules per pulse" (Office Action at page 2). The Office Action concedes that Brauer fails to disclose a slab laser having the configuration as claimed. However, the Action asserts that "[i]t would have been obvious to one having ordinary skill in the art at the time to the invention was made, to use

a slab laser including two narrowly spaced electrodes having opposed planar surfaces and a rectangular discharge region defined between the opposed planar surfaces of the two narrowly spaced electrodes of Brauer, as taught by Eisel for the purposes of delivering laser pulse to the CO₂ slab laser device; so as to increase the power and efficiency of the laser slab device during laser surgery of the patient's heart" (Office Action at page 4).

Claim 1, as amended, is directed to a cardiac laser surgery apparatus including a sealed CO₂ slab laser that includes two narrowly spaced electrodes having opposed planar surfaces and a rectangular discharge region defined between said opposed planar surfaces of said two narrowly spaced electrodes, a controller to operate said laser to provide pulses of adjustable length shorter than 100 ms at energy levels of between 8 and 80 Joules per pulse, and a laser delivery system for delivering laser pulses from said laser to a patient's heart.

Claim 6, as amended, is directed to a method of cardiac laser surgery including operating a sealed CO₂ slab laser to output laser pulses and delivering said laser pulses of adjustable length shorter than 100 ms at energy levels between 8 and 80 Joules per pulse to a patient's heart.

The pulse parameters and relatively high energy levels recited in claims 1 and 6 allow a sealed CO₂ slab laser to effectively treat cardiac tissue during a myocardial revascularization procedure by creating a channel within a patient's heart muscle (to permit blood flow and revascularization) in a single laser pulse while the heart is just beginning a ventricular contraction (at the beginning of the R wave), for example.

In contrast, Brauer does not disclose the use of a **slab** CO₂ laser of any configuration, and moreover, fails to disclose operating a laser to provide pulses of adjustable length shorter than 100 ms at energy levels of between 8 and 80 Joules per pulse, but rather, discloses "emitting a pulse of low power 10.6 micron laser light, i.e., less than 1000 W and preferably having a power within the range of 25-50W, with a beam diameter of approximately 1 mm" (Brauer at col. 10, lines 19-24) and a "laser delivery system with a low power CO₂ laser 700, typically on the order of 25-50 W..." (Brauer at col. 12, lines 20-27). Because Brauer fails to disclose the actual pulse length of this laser pulse, one cannot calculate the specific power in Joules per pulse.

Given the lower power operation of the Brauer device, "multiple applications of the laser radiation are required to create each [myocardial] channel" during a transmyocardial revascularization (TMR) procedure. See Brauer at col. 11, lines 1-4. Brauer even distinguishes the high power CO₂ lasers of the prior art (col. 3, line 35) from the "lower power CO₂ laser" of his invention. See Brauer at col. 4, lines 27, 42; col. 4, line 42; col. 12, lines 12, 21-23).

Eisel is directed to a slab-waveguide laser including spaced-apart, slab electrodes, and a resonator formed around the slab electrodes, to provide an unstable waveguide resonator in a direction parallel to faces of the slab electrodes and a stable waveguide resonator in a direction perpendicular to the slab electrodes (see Eisel at col. 4, lines 46-56). Eisel does not remedy the failure of Brauer to describe the invention as claimed. Specifically, Eisel does not disclose the operating characteristics of the sealed CO₂ slab laser as claimed (such as pulse parameters of energy levels and pulse length) or even delivering laser pulses to a patient's heart.

Moreover, the proposed combination of the delivery system of Brauer including the flexible waveguide 104, for example, and the slab-waveguide laser of Eisel including mirrors 4 and 5, for example, would be inoperative for the intended purpose of treating cardiac tissue. For example, the waveguide arrangement of Eisel does not provide sufficient focus of the beam through the entire depth of cardiac muscle tissue during the creation of a myocardial channel with a single pulse at the claimed energy levels. If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. See *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984); MPEP § 2143.01. "Although a reference need not expressly teach that the disclosure contained therein should be combined with another ... the showing or combinability, in whatever form, must nevertheless be 'clear and particular.'" *In re Dembiczak*, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (internal citations omitted).

The cited Brauer and Eisel references, taken alone or in combination, nowhere suggest the subject matter of claims 1 and 6, and claims 1 and 6 are allowable under 35 U.S.C. § 103(a) over these references. The remaining claims depend on either claim 1 or 6 and are also allowable.

Applicant : Robert Andrews et al.
Serial No. : 09/777,915
Filed : February 5, 2001
Page : 8 of 8

Attorney's Docket No.: 08261-017001

CONCLUSION

Allowance of all claims is respectfully solicited.

Please apply any charges or credits to deposit account 06-1050, referencing attorney docket number 08261-017001.

Respectfully submitted,

Date: 10/17/2005



David L. Schuler
Reg. No. 51,190

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906